DOCUMENT RESUME

ED 109 678 CS 202 158

AUTHOR	Haynes, James L.; And Others
TITLE	Demographic Factors in the Education of Relations in Analogy Picture Pairs. Technical Report No. 7.
INSTITUTION	Minnesota Univ., Minneapolis. Dept. of Psychology.
SPONS AGENCY	Office of Naval Research, Washington, D.C. Personnel and Training Research Programs Office.
PUB DATE	Jan 75
NOTE	29p.
EDRS PRICE	MF-$0.76 HC-$1.95 PLUS POSTAGE
DESCRIPTORS	*Cultural Factors; *Demography; Educational Research; *Paired Associate Learning; Perception; *Pictorial Stimuli; Racial Characteristics; Sex Differences; Social Class
IDENTIFIERS	*Analogical Reasoning

ABSTRACT

The influence of the demographic factors of sex, race, and social class on education of relations in picture pairs by high school students is examined. The bulk of this report is composed of three tables which list the picture-pair items for which frequency of relation education differed significantly between males and females, between whites and nonwhites, and between higher and lower social class groups. The items were not culturally neutral insofar as sex, race, and social class were concerned. (Author/LL)

****
* Documents acquired by ERIC include many informal unpublished *
* materials not available from other sources. ERIC makes every effort *
* to obtain the best copy available. nevertheless, items of marginal *
* reproducibility are often encountered and this affects the quality *
* of the microfiche and hardcopy reproductions ERIC makes available *
* via the ERIC Document Reproduction Service (EDRS). EDRS is not *
* responsible for the quality of the original document. Reproductions *
* supplied by EDRS are the best that can be made from the original. *
****

U.S. DEPARTMENT OF HEALTH,
EDUCATION & WELFARE
NATIONAL INSTITUTE OF
EDUCATION
THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

SCOPE OF INTEREST NOTICE
The ERIC Facility has assigned this document for processing to: CS CG
In our judgement, this document is also of interest to the clearinghouses noted to the right. Indexing should reflect their special points of view.

Technical Report No. 7

DEMOGRAPHIC FACTORS IN THE EDUCTION OF RELATIONS IN ANALOGY PICTURE PAIRS

James L. Haynes, Rene' ". Dawis,
and Leodegario V. Soriano

January 1975

Technical Report

Prepared under Contract No. N00014-67-A-0113-0030
NR 150-352
Personnel and Training Research Programs
Office of Naval Research (Code 458)
Arlington, Virginia 22217

Approved for public release; distribution unlimited.
Reproduction in whole or in part is permitted for
any purpose of the United States Government.

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER Technical Report No. 7	2. GOVT ACCESSION NO.	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) Demographic Factors in the Eduction of Relations in Analogy Picture Pairs		5. TYPE OF REPORT & PERIOD COVERED Technical Report 6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) James L. Haynes, Rene' V. Dawis, and Leodegario V. Soriano		8. CONTRACT OR GRANT NUMBER(s) N00014-67-A-0113-0030
9. PERFORMING ORGANIZATION NAME AND ADDRESS Department of Psychology University of Minnesota Minneapolis, Minnesota 55455		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS 61153N RR 042-04-01 RR 042-04 NR 150-352
11. CONTROLLING OFFICE NAME AND ADDRESS Personnel and Training Research Programs Office of Naval Research (Code 458) Arlington, Virginia 22217		12. REPORT DATE January 1975 13. NUMBER OF PAGES 19
14. MONITORING AGENCY NAME & ADDRESS(if different from Controlling Office)		15. SECURITY CLASS. (of this report) UNCLASSIFIED 15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT (of this Report)

Approved for public release; distribution unlimited. Reproduction in whole or in part is permitted for any purpose of the United States Government.

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

18. SUPPLEMENTARY NOTES

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Analogy
Analogical reasoning
Demographic factors
Picture analogies
Race differences
Sex differences
Social class differences

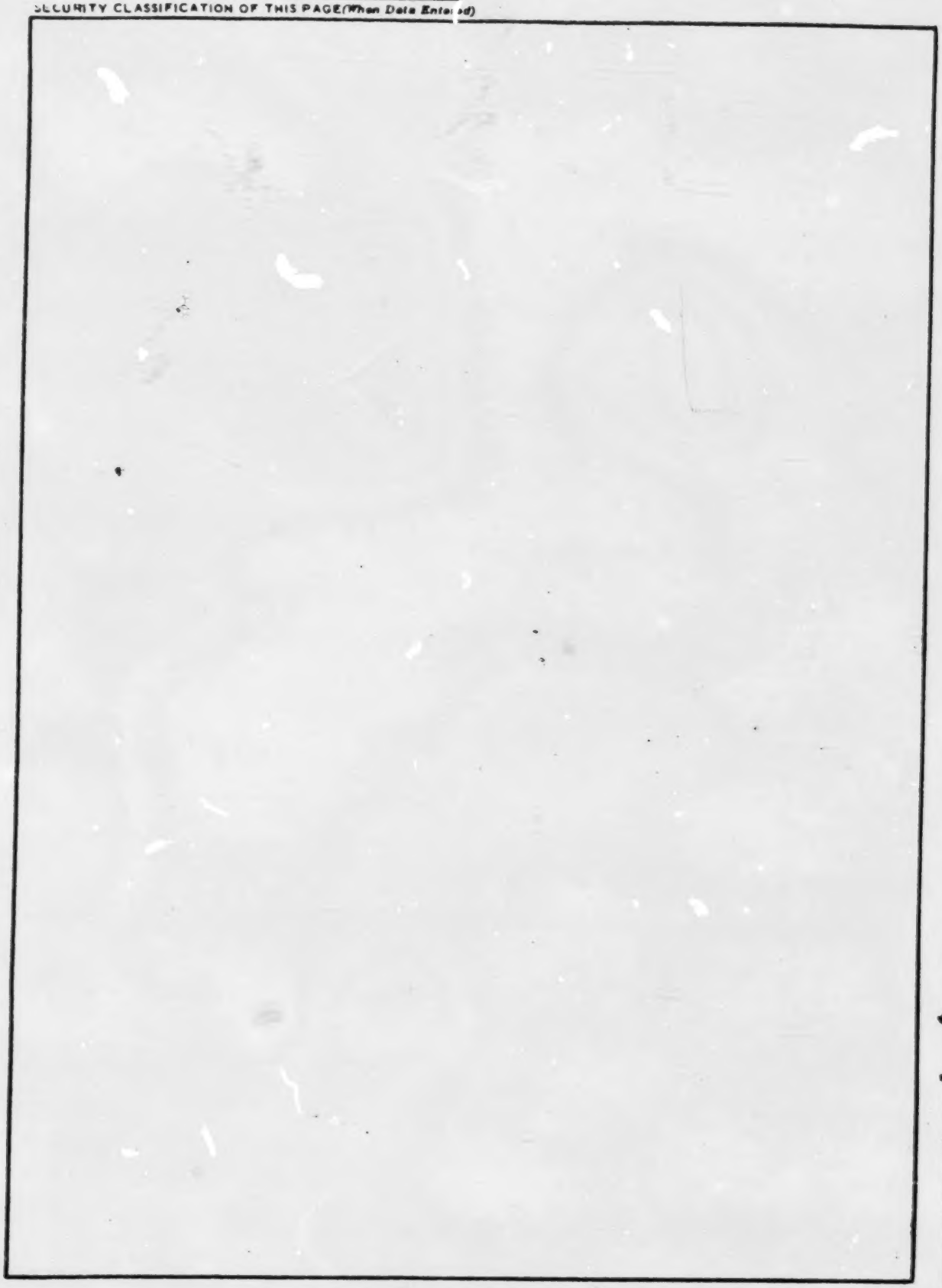
20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

The influence of the demographic factors of sex, race and social class on eduction of relations in picture pairs is examined. This report lists the picture pair items for which frequency of relation eduction differs significantly between males, between whites and nonwhites, and between higher and lower social class groups. These items may be presumed not to be culturally neutral, insofar as sex, race and social class are concerned. Implications of these findings for the further study of analogical reasoning are given.

DD FORM 1 JAN 73 1473 EDITION OF 1 NOV 65 IS OBSOLETE
S/N 0102-014-6601

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)



Demographic Factors in the Eduction of Relations in Analogy Picture Pairs

James L. Haynes, Rene' V. Dawis
and Leodegario V. Soriano

Technical Report No. 6 of this series presented norms for the frequency of educing relations (expressed in a "relation eduction index" or REI) for 500 picture pairs. The compilation of these REI norms was part of the study of picture analogies designed to parallel the study of word analogies. As in the case of word analogies, the approach to picture analogies involved the "breaking down" of the analogy items into their component pairs and the study of the second step in the analogy-problem-solving process, namely, the eduction of relations, for these picture pairs.

An REI for a given picture pair and for a given relation was obtained by presenting the picture pair to a sample of subjects and asking the subjects if the relation was seen as linking the two pictures. The REI is the percentage of the group of subjects who indicated that the given relation did link the pictures. Technical Report 6 listed REIs for 500 picture pairs and 10 relations. The norms were obtained from over 3,000 high school students. Many of the pictures were drawn to be picture-equivalents of word pairs used in the word analogy study. The ten relations involved were: (a) class-member, (b) activity/use, (c) functional, (d) conversion/process, (e) order/time, (f) opposites, (g) cause-effect, (h) word pattern, (i) association, and (j) worker-tool/product. For definitions of these relations as actually presented to the normative sample, the reader is referred to Technical Report 6. Technical Report 6 also gives details about the sample (source, grade in school, sex, age, race, number of children in family, annual family income, housing, father's education, mother's education, father's occupation and mother's occupation) and about the data collection process.

The present report concerns the influence of the demographic factors of sex, race and social class on the eduction of relations in picture pairs.

Method

Chi square analysis was used to determine if a demographic factor was implicated in the REI data. The data were organized into four-fold tables, one classification being eduction or non-eduction of the relation, the other classification being the demographic factor, i.e., sex (male vs. female), race (white vs. nonwhite) or social class (high, or above $10,000, in reported family income, vs. low, or below $10,000). A four-fold table was constructed for each combination of picture pair, relation, and demographic factor. The .05 level (chi square ≥ 3.84) was used to indicate significance in the test of the null hypothesis of independence of classification.

Results

Table 1 lists the items (picture pairs) for which significant differences in REIs were observed between the sex groups, while Table 2 shows the significant items for the race groups, and Table 3 for the social class groups. Each table indexes the Item Number (for reference to Technical Report 6) and lists the Yes percentages for each group. Excluded from the tables are items which, though found to yield significant differences on chi square test, had N's of less than 10 for any cell.

The picture pairs named in these three tables may be presumed to be not culturally neutral. For whatever reason, one of the groups being compared educed the relation at issue more frequently than the other. Further study of these items producing significant differences might shed light on the role of culture (at least sex, race and social class culture) in relation educing and ultimately in analogical reasoning. Furthermore, by using items constructed from picture pairs for which relation eduction frequency (REI) was not culturally

influenced, tests might be developed to focus on measuring the ability to see equivalent relations in two different pairs, which is at least a (and perhaps the) key component of analogical reasoning.

Reference

Haynes, J. L., Dawis, R. V., Monson, E. Q., Lopez, F. G., & Soriano, L. V. Relation eduction index norms for 500 picture pairs and 10 relations: High school sample. Technical Report No. 6, November, 1974, University of Minnesota. Contract Number N00014-67-A-0113-0030, Office of Naval Research.

Table 1

Sex Differences[a] in Eduction of Relations
in Picture Pairs of Type of Relation

	Relation	Item Number	Picture Pair	Percent Yes M	Percent Yes F	Percent Yes Total	N
I.	Class Member	A- 14	Tailor : Material cloth	78	98	89	80
		A- 19	Roof : Room	19	50	36	80
		A- 92	Coffee : Tea	89	64	75	80
		B- 6	Calf : Cow	87	98	94	109
		B- 16	Spider : Fly	64	87	78	109
		B- 22	Tree : Rake	63	89	78	109
		B- 24	Camera : Photo	85	100	94	109
		B- 25	Ball : Baseball bat	83	98	92	109
		B- 27	Steering wheel : Car	85	100	94	109
		B- 47	Desk : Chair	76	95	87	109
		B- 51	Jail : Mouse hole	24	6	14	109
		B- 58	Drums : Cymbals	89	100	95	109
		C- 9	Boy : Dog	29	6	17	68
		C- 91	Net : Fish	83	55	68	68
		D- 9	Scissors : Cloth	63	85	70	121
		D- 19	Milk : Butter	91	74	86	121
		D- 31	Bow : Bow	40	15	32	121
		D- 37	Cloth : Shirt	63	92	73	121
		D- 47	Galaxy : Star	84	64	77	121
		D- 51	Piggy bank : Tank	27	5	19	121
		D- 52	Ear : Bald head	82	100	88	121
		D- 55	Garage : Car	81	97	86	121
		D- 73	Justice : Jail	35	15	29	121
		D- 84	Tailor : Scissors	81	97	86	121
		D- 95	Moth : Cloth	37	13	29	121
		E- 2	Feet : Foot	72	91	82	97
		E- 36	Nail : Sail	2	21	12	97
II.	Activity/ Use	A- 82	Beaver : Cleaver	5	33	19	43
		B- 44	Window : Porthole	75	51	61	89
		C- 71	Target : Circle	76	43	60	65
		D- 12	Cloud (bomb) : Rain	28	58	36	121
		D- 17	Paper : Pencil	85	100	89	121
		D- 24	Lumber : Arrow	32	12	27	121
		D- 45	Blimp : Helicopter	83	61	77	121
		D- 47	Galaxy : Star	69	42	62	121
		D- 53	Spider : Dog	14	36	20	121
		E- 8	Sea : Fish	48	80	69	71
		E- 10	Leaf : Tree	80	100	93	71
		E- 14	Carriage : Car	80	100	93	71
		E- 17	Caterpillar : Butterfly	72	96	87	71
		E- 19	Lettuce : Cabbage	72	98	89	71

[a]Statistically significant at the .05 level by chi square test

Table 1 (cont.)

	Relation	Item Number	Picture Pair	Percent Yes M	Percent Yes F	Percent Yes Total	N
II.	Activity/ Use (cont.)	E- 21	T.V. : Radio	72	93	86	71
		E- 23	Comb : Brush	84	100	94	71
		E- 25	Jack : Car	48	76	66	71
		E- 30	Ashtray : Cigarette	56	89	77	71
		E- 35	Kitten : Cat	76	100	92	71
		E- 38	Bald : Hair	60	89	78	71
		E- 39	Horse : Buggy	20	96	87	71
III.	Functional	A- 9	Hammer : Anvil	82	50	66	59
		A- 36	Rope : String	86	55	70	59
		A- 49	Bow and arrow : Rifle	64	33	48	59
		A- 61	Bird : Alligator	21	0	10	59
		B- 4	Slide rule : Number	96	72	84	55
		B- 9	Pistol : Bow	46	17	31	55
		B- 16	Spider : Fly	77	38	56	55
		B- 33	Snow : Rain	50	21	35	55
		B- 53	Cat : Dog	54	14	33	55
		B- 67	Diamond : Square	42	10	25	55
		B- 73	Ring : Wing	29	0	13	55
		B- 82	Elephant : Horse	27	0	13	55
		B- 90	Leaf : Cabbage	62	31	45	55
		B- 91	Hockey stick : Baseball bat	62	28	44	55
		D- 12	Cloud (bomb) : Rain	24	63	51	84
		D- 14	Perfume bottle : Skunk	63	34	43	84
		D- 22	Farmer : Plow	72	91	86	84
		D- 62	Cat : Tiger	84	55	64	84
		D- 75	Scissors : Razor	64	31	41	84
		E- 33	Compass : Compass	79	41	58	66
		E- 39	Horse : Buggy	62	89	77	66
		E- 61	Cheese : Sandwich	66	89	79	66
V.	Conversion/ Process	B- 4	Slide rule : Numbers	64	88	79	68
		B- 13	Push : Pull	40	70	59	68
		B- 15	Rain : Umbrella	60	86	76	68
		B- 17	Fire : Smoke	56	81	72	68
		B- 21	Roof : House	60	86	76	68
		B- 35	Fish hook : Fish	56	84	74	68
		B- 47	Desk : Chair	44	81	68	68
		B- 84	Dog : Bone	64	88	79	68
		C- 33	Jewelry : Ring	76	100	90	61
		C- 60	Bow (hair) : Bow (violin)	0	25	15	61
		D- 22	Farmer : Plow	54	89	62	75
		D- 86	Grass : Cows	40	72	48	75
		E- 37	Mountain : Hill	77	95	89	88
		E- 59	Blacksmith : Anvil	70	44	53	88

Table 1 (cont.)

	Relation	Item Number	Picture Pair	Percent Yes M	F	Total	N
VI.	Order/Time	A- 5	Lion : Tiger	96	76	88	84
		A- 12	Cowboy : Lasso rope	100	88	93	84
		A- 64	Bow : Hair	74	94	82	84
		B- 30	Bubble gum : Ice cream	53	17	29	56
		B- 90	Leaf : Cabbage	82	49	60	56
		C- 13	Sh[illegible]p : Material-cloth	100	64	84	31
		C- 26	N[illegible]rse : Blood	53	93	71	31
		C- 95	Beaver : Beaver dam	88	43	68	31
		D- 5	Soldier : Rifle	74	100	84	62
		D- 46	Umbrella : Rain	77	100	86	62
		E- 32	Corn kernels : House	50	17	39	71
		E- 40	Book : Chef	58	87	68	71
		E- 63	Wick : Candle	77	100	84	71
VII.	Opposite	B- 20	Shoe : Shirt	91	52	70	48
		B- 42	Fire extinguisher : Fire hose	100	65	81	48
		B- 43	Corn : Bread	59	23	40	48
		B- 60	Bed : Bedroom	100	73	85	48
		B- 96	Eskimo : Igloo	100	77	88	48
		C- 15	Skis : Toboggan	88	52	66	44
		C- 52	Egg : Chick	59	96	82	44
		C- 75	Sheriff : Jail	53	85	73	44
		D- 17	Paper : Pencil	45	75	65	64
		D- 19	Milk : Butter	36	66	56	64
		D- 49	Bible : Praying hands	27	63	51	64
		D- 96	Bow and arrow : Fishing rod	9	44	32	64
		E- 4	Bullet : Arrow	7	47	38	66
		E- 65	Biplane : Jet	64	92	86	66
		E- 73	La[illegible]yer : Justice	71	33	42	66
		E- 93	Doctor : Lawyer	64	24	32	66
VIII.	Cause-Effect	A- 7	Mitten : Kitten	15	2	8	120
		A- 15	Eat : Bread	50	30	40	120
		A- 32	Conductor : Violin	82	64	74	120
		A- 54	Cigarette : Coffin	65	42	54	120
		A- 86	Draftsman : Ruler	70	51	61	120
		A- 93	Pick : Wick	23	5	14	120
		A- 95	Plumber : Pipe	48	21	35	120
		A- 98	Bread : Eat	63	42	53	120
		B- 4	Slide rule : Numbers	73	36	56	50
		B- 37	Baby-birth : Coffin	58	22	41	50
		B- 44	Window : Porthole	41	4	24	50
		B- 46	Chair : House	52	17	36	50
		B- 85	Match flame : Fire	78	100	88	50
		B- 86	Hose : Fire	28	0	12	50
		B- 91	Hockey stick : baseball bat	41	9	26	50
		B- 99	Sailor :	42	4	24	50

Table 1 (cont.)

	Relation	Item Number	Picture Pair	M	F	Total	N
VIII.	Cause-Effect (cont.)	D- 5	Soldier : Rifle	68	41	52	98
		D- 25	Oar : Bicycle	3	22	14	98
		D- 28	Banjo : Guitar	85	64	73	98
		D- 53	Spider : Dog	23	5	13	98
		D- 83	Bat : Dracula	54	85	72	98
		E- 20	Rain : Water	58	78	68	109
		E- 33	Compass : Compass	57	33	45	109
		E- 50	Sun : Moon	52	76	64	109
		E- 59	Blacksmith : Anvil	79	53	66	109
		E- 65	Biplane : Jet	92	76	84	109
		E- 84	Gum : Cup	13	0	7	109
IX.	Pattern	A- 17	Owl : Cat	15	2	9	110
		A- 75	Sea captain : Ship	42	20	32	110
		A- 96	Seal : Reel	62	37	50	110
		B- 2	Dog : Puppy	90	41	62	49
		B- 5	Carpenter : Hammer	90	56	70	49
		B- 6	Calf : Cow	85	52	66	49
		B- 9	Pistol : Bow	30	4	15	49
		B- 10	Pig : Ham	95	67	79	49
		B- 12	Astronaut : Moon	90	52	68	49
		B- 19	Bone : Telephone	35	70	55	49
		B- 48	Sewing machine : Needle	90	56	70	49
		B- 53	Cat : Dog	55	16	33	49
		B- 63	Knife : Axe	70	30	47	49
		B- 69	Match flame : Candle	85	48	64	49
		B- 70	Mailman : Letter	90	59	72	49
		B- 93	Lifeguard : Pool	75	37	53	49
		B- 94	Snow : Toboggan	75	37	53	49
		B- 95	Pull : Bull	5	44	28	49
		C- 9	Boy : Dog	28	6	15	60
		C- 15	Skis : Toboggan	92	63	75	60
		C- 39	Breast : Wing	96	66	78	60
		C- 65	Butterfly : Birds	28	3	14	60
		D- 38	Porthole : Ship	48	9	39	44
		D- 73	Justice : Jail	45	0	35	44
X.	Association	D- 5	Soldier : Rifle	78	97	90	97
		D- 30	Film : Photo	61	84	75	97
		D- 32	Sugar cane : Sugar	72	92	84	97
		D- 37	Cloth : Shirt	61	83	75	97
		D- 86	Grass : Cows	83	57	67	97
		D- 99	Mountain : Goat	89	62	72	97
		D-100	Blacksmith : Horse	89	66	74	97
		E- 40	Book : Chef	51	78	63	107
		E- 41	Doctor : Stethoscope	86	100	92	107

Table 1 (cont.)

	Relation	Item Number	Picture Pair	M	F	Total	N
X.	Association (cont.)	E- 74	Mop : Floor	74	94	83	107
		E- 80	Sewing machine : Cloth	70	98	83	107
		E- 89	Teller : Dollar	81	96	88	107
XIV.	Worker-Tool/ Product	A- 21	Chef : Turkey	90	52	67	51
		A- 69	Yarn : Sweater	80	100	92	51
		B- 12	Astronaut : Moon	74	97	84	79
		B- 39	Water : Glass	41	73	55	79
		B- 43	Corn : Bread	64	33	51	79
		B- 52	Pilot : Jet	79	97	87	79
		C- 24	Baby-birth : Face	20	56	39	76
		C-100	Artist : Picture painting	71	95	84	76
		D- 54	Bus : Apartment	35	15	26	88
		D- 60	Boy : Girl	74	50	64	88
		E- 6	Hammer : Saw	42	66	54	112
		E- 8	Sea : Fish	53	83	68	112
		E- 21	T.V. : Radio	44	67	55	112
		E- 31	Pistol : Sun	11	0	5	112
		E- 52	Butterfly : Moth	44	65	54	112
		E- 56	Haystack : Meat	32	11	22	112
		E- 65	Biplane : Jet	68	87	77	112
		E- 73	Lawyer : Justice	68	35	52	112
		E- 78	Pencil : Pen	56	78	67	112
		E- 80	Sewing machine : Cloth	77	93	85	112
		E- 93	Doctor : Lawyer	25	7	16	112
		E- 96	Cobbler : Dollar	40	20	31	112
		E- 97	Bass violin : Violin	60	81	70	112

Table 2

Race Differences[a] in Eduction of Relations
in Picture Pairs by Type of Relation

Relation	Item Number	Picture Pair	Percent Yes W	Percent Yes NonW	Percent Yes Total	N
I. Class Member	A- 7	Mitten : Kitten	6	38	13	80
	A- 31	Pen : Hen	5	25	9	80
	A- 34	Man : Map	15	50	22	80
	A- 48	Hoof : Horse	79	50	73	80
	A- 58	Car : Boat	29	63	35	80
	A- 60	Bow : Bow	25	56	32	80
	A- 71	Bubble gum : Ice cream	30	63	37	8
	B- 26	Line : Pine tree	81	53	73	109
	B- 28	Beans : Coffee	81	57	74	109
	B- 44	Window : Porthole	71	43	63	109
	B- 47	Desk : Chair	82	100	87	109
	B- 72	Pick : Guitar	82	60	76	109
	B- 88	Sunrise : Sunset	72	97	79	109
	C- 91	Net : Fish	59	93	67	68
	C- 98	Bread : Meat	55	93	65	68
	D- 1	Capitol : Comb	16	42	21	121
	D- 2	Baby : Boy	88	63	84	121
	D- 3	Peasant : Rice	72	32	66	121
	D- 5	Soldier : Rifle	88	58	83	121
	D- 10	Tennis : Tennis court	71	42	66	121
	D- 21	Shovel : Mop	38	11	33	121
	D- 45	Blimp : Helicopter	83	47	77	121
	D- 47	Galaxy : Star	85	42	78	121
	D- 68	Wolf : Sheep	64	37	60	121
	E- 1	Tennis court : Racket	90	60	85	97
	E- 50	Sun : Moon	68	100	73	97
	E- 59	Blacksmith : Anvil	90	67	86	97
	E- 91	Sheep : Yarn	77	47	72	97
	E- 92	Cat : Dog	49	87	55	97
II. Activity/ Use	A- 6	Cutting wood : Logs	56	94	70	43
	A- 12	Cowboy : Lasso rope	44	88	60	43
	A- 16	Screws : Screwdriver	63	100	77	43
	A- 18	Hands : Marriage	70	100	81	43
	A- 19	Roof : Room	15	56	30	43
	A- 20	Fall : Winter	41	88	58	43
	A- 26	Saw : Log	56	94	70	43
	A- 39	Oil : Race car	59	100	74	43
	A- 52	Goat : Milk	52	100	70	43
	A- 53	Paper clip : Paper	48	88	63	43
	A- 69	Yarn : Sweater	52	88	65	43

[a]Statistically significant at the .05 level by chi square test

Table 2 (cont.)

	Relation	Item Number	Picture Pair	Percent Yes W	NonW	Total	N
II.	Activity/ Use (cont.)	A- 72	Cup : Saucer	67	100	79	43
		A- 83	Spring : Fall	22	63	37	43
		A- 85	Jail : Mouse hole	4	38	16	43
		A- 88	Door : House	63	100	77	43
		B- 28	Beans : Coffee	81	58	74	89
		B- 44	Window : Porthole	69	41	61	89
		B- 72	Pick : Guitar	82	56	74	89
		B- 77	House : Mousetrap	76	96	82	89
		D- 2	Baby : Boy	59	88	74	121
		D- 3	Peasant : Rice	38	76	58	121
		D- 4	Box : Jar	91	70	80	121
		D- 8	Sea : Wave	48	68	59	121
		D- 17	Paper : Pencil	82	97	90	121
		D- 20	Spider : Spider web	75	98	87	121
		D- 21	Shovel : Mop	50	28	39	121
		D- 26	Numbers : Number	84	98	91	121
		D- 28	Banjo : Guitar	89	100	95	121
		D- 29	Janitor : Pail	73	92	83	121
		D- 30	Film : Photo	82	63	72	121
		D- 34	Tree : Tree without leaves	82	98	91	121
		D- 40	Axe : Tree	33	65	50	121
		D- 41	Indian : Arrow	75	95	85	121
		D- 43	Key : Keyhole	75	95	85	121
		D- 44	Match (flame) : Cigarette	73	95	84	121
		D- 45	Blimp : Helicopter	88	70	78	121
		D- 46	Umbrella : Rain	45	77	61	121
		D- 47	Galaxy : Star	77	50	63	121
		D- 49	Bible : Praying hands	80	97	89	121
		D- 52	Ear : Bald head	73	93	84	121
		D- 55	Garage : Car	50	85	68	121
		D- 58	Acorn : Pine tree	27	48	38	121
		D- 61	Football catch : Football helmet	79	97	88	121
		D- 65	Oar : Rowboat	78	98	89	121
		D- 69	Cleaning woman : Broom	69	88	79	121
		D- 76	Corn field : Corn kernels	73	97	85	121
		D- 81	Arguing : Statue	44	65	55	121
		D- 94	Milk : Milk	75	95	85	121
		D- 98	Smile : Sad	47	78	63	121
		E- 22	Door : Car	10	35	17	71
		E- 33	Compass : Compass	80	40	69	71
		E- 80	Sewing machine : Cloth	78	50	70	71
III.	Functional	B- 19	Bone : Telephone	0	30	6	55
		B- 43	Corn : Bread	50	100	59	55
		B- 86	Hose : Fire	2	40	9	55
		D- 1	Capitol : Comb	14	44	21	84
		D- 3	Peasant : Rice	80	50	73	84
		D- 5	Soldier : Rifle	98	83	95	84

Table 2 (cont.)

	Relation	Item Number	Picture Pair	Percent Yes W	NonW	Total	N
III.	Functional (cont.)	D- 33	Cat : Mouse	73	28	63	84
		D- 50	Ham : Dam	3	22	7	84
		D- 68	Wolf : Sheep	67	33	60	84
		D- 96	Bow and arrow : Fishing rod	22	67	32	84
		E- 2	Feet : Foot	75	45	65	66
		E- 33	Compass : Compass	68	36	58	66
		E- 66	Train : Car	25	55	35	66
		E- 91	Sheep : Yarn	89	64	80	66
		E- 93	Doctor : Lawyer	5	27	12	66
V.	Conversion/ Process	B- 17	Fire : Smoke	89	37	74	68
		B- 18	Mittens : Glove(s)	65	95	74	68
		B- 20	Shoe : Shirt	20	53	30	68
		B- 23	Fruit : Nut	35	68	45	68
		B- 25	Bull : Baseball bat	54	89	65	68
		B- 28	Beans : Coffee	83	47	72	68
		B- 53	Cat : Dog	17	47	26	68
		B- 77	House : Mousetrap	65	95	74	68
		B- 91	Hockey stick : Baseball bat	26	63	37	68
		B- 95	Pull : Bull	4	32	12	68
		B- 98	Vacuum cleaner : Mop	50	95	63	68
		C- 15	Skis : Toboggan	79	50	69	61
		C- 85	Train : Rain	3	30	12	61
		C- 94	Owl : Cow	8	40	19	61
		D- 59	Snail : Turtle	45	83	51	75
		D- 72	Rollerskate : Bicycle	47	92	54	75
		D- 85	Track : Road	52	92	58	75
		E- 7	Rain : Cane	5	23	10	88
		E- 8	Sea : Fish	62	88	70	88
		E- 23	Comb : Brush	69	92	76	88
		E- 27	Traffic : Policeman	53	81	61	88
		E- 33	Compass : Compass	56	31	49	88
		E- 39	Horse : Buggy	55	81	63	88
		E- 41	Doctor : Stethoscope	63	92	71	88
		E- 50	Sun : Moon	65	88	72	88
		E- 53	Cap : Jacket	39	69	48	88
		E- 54	Tire : Car	65	88	72	88
		E- 57	Cup : Glass	60	88	68	88
		E- 70	Sea : Sailboat	48	85	59	88
		E- 76	Binoculars : Telescope	74	96	81	88
		E- 78	Pencil : Pen	56	88	66	88
		E- 83	Club : Spade	32	62	41	88
		E- 87	Broom : Mop	58	88	67	88
		E- 88	Cane : Crutch	74	96	81	88
		E- 96	Cobbler : Dollar	47	19	39	88
		E- 97	Bass violin : Violin	71	96	78	88

Table 2 (cont.)

	Relation	Item Number	Picture Pair	Percent Yes W	Percent Yes NonW	Percent Yes Total	N
VI.	Order/ Time	A- 64	Bow : Hair	77	100	82	84
		A- 71	Bubble gum : Ice cream	34	63	41	84
		A- 92	Coffee : Tea	47	95	58	84
		B- 26	Line : Pine tree	73	30	65	56
		B- 94	Snow : Toboggan	84	50	78	56
		D- 35	Battery : Flashlight	88	53	77	62
		D- 36	Train : Airplane	64	30	54	62
		D- 47	Galaxy : Star	88	41	74	62
		D- 99	Mountain : Goat	39	80	67	62
		E- 11	Grapes : Wine bottle	100	76	94	71
		E- 16	Cow : Milk	100	82	96	71
		E- 17	Caterpillar : Butterfly	96	76	92	71
		E- 33	Compass : Compass	65	18	54	71
		E- 42	Ship : Building	4	24	8	71
		E- 58	Milk : Cheese	91	65	85	71
		E- 60	Seals : Wheel	7	29	13	71
		E- 61	Cheese : Sandwich	63	94	70	71
		E- 66	Train : Car	26	59	34	71
		E- 82	Roller skate : Broken arm (sling)	67	24	56	71
		E- 91	Sheep : Yarn	94	65	87	71
		E- 93	Doctor : Lawyer	2	24	7	71
		E- 99	Bumper : Car	70	100	77	71
VII.	Opposite	C- 19	Owl : Scholar	60	24	36	44
		D- 5	Soldier : Rifle	39	77	47	64
		D- 9	Scissors : Cloth	50	100	60	64
		D- 11	Shirt : Tie	48	92	57	64
		D- 15	Farm : Barn	38	77	46	64
		D- 16	Train : Track	50	92	59	64
		D- 20	Spider : Spider web	44	83	52	64
		D- 28	Banjo : Guitar	54	92	62	64
		D- 29	Janitor : Pail	24	77	35	64
		D- 32	Sugar cane : Sugar	52	100	61	64
		D- 38	Porthole : Ship	29	77	39	64
		D- 41	Indian : Arrow	46	85	54	64
		D- 49	Bible : Praying hands	42	85	51	64
		D- 52	Ear : Bald head	34	69	41	64
		D- 56	Celery : Carrot	40	85	49	64
		D- 61	Football catch : Football helmet	40	92	51	64
		D- 64	Eggs : Chicken	54	92	62	64
		D- 65	Oar : Rowboat	38	92	49	64
		D- 82	Mine worker : Coal	34	69	41	64
		D- 84	Tailor : Scissors	42	85	51	64
		D- 86	Grass : Cows	18	75	29	64
		D- 91	Police : Jail	39	77	47	64
		D- 92	Carpenters : House	44	92	54	64

Table 2 (cont.)

	Relation	Item Number	Picture Pair	Percent Yes W	Percent Yes NonW	Percent Yes Total	N
VII.	Opposite (cont.)	E- 8	Sea : Fish	36	80	70	66
		E- 28	City : Building	57	86	80	66
		E- 35	Kitten : Cat	57	94	86	66
		E- 37	Mountain : Hill	50	82	75	66
		E- 44	Rock : Lock	43	8	16	66
		E- 49	Hunter : Gun	50	92	83	66
		E- 51	Sail : Sailboat	43	84	75	66
		E- 54	Tire : Car	50	84	77	66
		E- 55	Gum : Drum	50	10	19	66
		E- 60	Seals : Wheel	29	2	8	66
		E- 75	Corn : Horn	50	10	19	66
		E- 76	Binoculars : Telescope	50	88	80	66
		E- 84	Gum : Cup	36	8	14	66
		E- 99	Bumper : Car	50	82	75	66
		E-100	Wax : Candle	43	78	70	66
VIII.	Cause-Effect	A- 1	Teacher : Book	53	81	62	120
		A- 2	Fire hose : Fire hydrant	44	67	51	120
		A- 6	Cutting wood : Logs	52	74	59	120
		A- 7	Mitten : Kitten	1	19	7	120
		A- 10	Glass of ice water : Beer mug	31	56	38	120
		A- 16	Screws : Screwdriver	68	88	74	120
		A- 19	Roof : Room	23	44	29	120
		A- 24	Fireman : Fire	32	61	41	120
		A- 47	Fruit : Orange	27	64	38	120
		A- 55	Book : Bible	36	69	46	120
		A- 62	Bullet : Rifle	46	75	55	120
		A- 72	Cup : Saucer	69	94	77	120
		A- 73	Comb : Hair	47	81	57	120
		A- 79	Meat : Ham	32	56	39	120
		A- 80	Janitor : Cleaning woman	38	75	50	120
		A- 83	Spring : Fall	21	42	27	120
		A- 88	Door : House	44	75	54	120
		A- 92	Coffee : Tea	39	61	46	120
		B- 3	Spoon : Soup can	27	67	37	50
		B- 4	Slide rule : Numbers	46	91	56	50
		B- 11	Owl : Ant	6	36	13	50
		B- 17	Fire : Smoke	84	45	75	50
		B- 20	Shoe : Shirt	16	67	28	50
		B- 38	Scissors : Hammer	0	42	10	50
		B- 55	Hand clasp : Argue	45	91	55	50
		D- 4	Box : Jar	25	52	31	98
		D- 16	Train : Track	23	52	30	98
		D- 18	Submarine : Ship	50	86	58	98
		D- 40	Axe : Tree	30	62	37	98
		D- 41	Indian : Arrow	62	95	69	98

Table 2 (cont.)

	Relation	Item Number	Picture Pair	Percent Yes W	Percent Yes NonW	Percent Yes Total	N
VIII.	Cause-Effect (cont.)	D- 46	Umbrella : Rain	53	95	62	98
		D- 51	Piggy bank : Tank	23	0	18	98
		D- 52	Ear : Bald head	55	86	62	98
		D- 55	Garage : Car	59	90	66	98
		D- 56	Celery : Carrot	41	71	47	98
		D- 69	Cleaning woman : Broom	64	95	71	98
		D- 77	Apple : Orange	36	76	45	98
		D- 79	Kitten : Puppy	43	71	49	98
		D- 84	Tailor : Scissors	50	81	57	98
		D- 87	Cat : Mice	35	67	42	98
		D- 90	Bread : Butter	50	86	58	98
		D- 91	Police : Jail	64	90	70	98
		D- 98	Smile : Sad	51	81	58	98
		E- 8	Sea : Fish	36	62	51	109
		E- 12	Plow : Tractor	45	67	58	109
		E- 14	Carriage : Car	57	93	78	109
		E- 23	Comb : Brush	43	67	57	109
		E- 46	Door : Window	16	43	31	109
		E- 53	Cap : Jacket	25	46	37	109
		E- 57	Cup : Glass	25	52	40	109
		E- 61	Cheese : Sandwich	48	77	65	109
		E- 65	Biplane : Jet	73	92	84	109
		E- 78	Pencil : Pen	39	75	60	109
		E- 87	Broom : Mop	48	75	64	109
		E- 88	Cane : Crutch	50	74	64	109
		E- 94	Policeman : Police car	66	85	77	109
		E- 95	Chandelier : Lamp	50	80	68	109
		E- 97	Bass Violin : Violin	41	72	59	109
IX.	Pattern	A- 11	Germs : Cell	59	33	52	110
		A- 76	Dock : Lock	64	32	55	110
		A- 89	Dice : Rice	80	54	73	110
		C- 46	Leaf : Tea	57	15	47	60
		C- 95	Beaver : Beaver dam	87	46	78	60
		D- 1	Capitol : Comb	65	25	53	44
		D- 13	Spade : Spade	74	25	60	44
		D- 22	Farmer : Plow	26	75	40	44
		D- 23	Pail : Sail	74	33	63	44
		D- 29	Janitor : Pail	35	75	47	44
		D- 31	Bow (archery) : Bow (hair)	80	33	67	44
		D- 35	Battery : Flashlight	26	75	40	44
		D- 37	Cloth : Shirt	19	58	30	44
		D- 44	Match (flame) : Cigarette	42	83	53	44
		D- 45	Blimp : Helicopter	17	58	29	44
		D- 46	Umbrella : Rain	39	92	53	44

Table 2 (cont.)

	Relation	Item Number	Picture Pair	Percent Yes W	Percent Yes NonW	Percent Yes Total	N
IX.	Pattern (cont.)	D- 49	Bible : Praying hands	30	75	43	44
		D- 51	Piggy bank : Tank	81	33	67	44
		D- 52	Ear : Bald head	32	92	49	44
		D- 55	Garage : Car	42	92	56	44
		D- 57	Branch : Tree	45	92	58	44
		D- 64	Eggs : Chicken	42	92	56	44
		D- 65	Oar : Rowboat	40	83	52	44
		D- 69	Cleaning woman : Broom	34	75	46	44
		D- 77	Apple : Orange	30	75	43	44
		D- 78	Tea : Three	83	42	71	44
		D- 82	Mine worker : Coal	23	83	40	44
		D- 83	Bat : Dracula	37	83	50	44
		D- 86	Grass : Cows	20	58	31	44
		D- 88	Stamp : Lamp	76	33	63	44
		D- 92	Carpenters : House	30	83	45	44
		D- 93	Hourglass : Watch	50	92	62	44
		E- 27	Traffic : Policeman	26	60	34	67
		E- 48	Elbow : Arm	37	73	45	67
		E- 54	Tire : Car	25	73	37	67
		E- 56	Haystack : Meat	22	53	30	67
		E- 77	Doorknob : Door	41	80	50	67
		E- 80	Sewing machine : Cloth	24	60	33	67
		E- 86	Bat : Bat	92	66	86	67
X.	Association	D- 30	Film : Photo	86	61	75	97
		D- 45	Blimp : Helicopter	84	38	65	97
		D- 47	Galaxy : Star	82	51	69	97
		D- 57	Branch : Tree	100	88	95	97
		D- 68	Wolf : Sheep	65	37	53	97
		D- 74	Light attachment : Camera	93	73	85	97
		D- 79	Kitten : Puppy	80	51	68	97
		D- 82	Mine worker : Coal	87	60	76	97
		D- 84	Tailor : Scissors	98	85	93	97
		D- 87	Cat : Mice	76	51	66	97
		D- 88	Stamp : Lamp	1	20	9	97
		D- 89	Bow : Banjo	27	58	40	97
		D- 93	Hourglass : Watch	100	88	95	97
		E- 7	Rain : Cane	2	18	5	107
		E- 9	Fireman : Fire extinguisher	98	82	95	107
		E- 17	Caterpillar : Butterfly	94	76	92	107
		E- 41	Doctor : Stethoscope	96	75	92	107
		E- 59	Blacksmith : Anvil	82	56	78	107
		E- 63	Wick : Candle	67	94	71	107
		E- 89	Teller : Dollar	91	71	88	107

Table 2 (cont.)

	Relation	Item Number	Picture Pair	Percent Yes W	Percent Yes NonW	Percent Yes Total	N
XIV.	Worker-Tool/ Product	A- 92	Coffee : Tea	33	91	46	51
		B- 12	Astronaut : Moon	91	67	84	79
		B- 36	Boxer : Ring	87	57	79	79
		B- 99	Sailor : Potato	13	38	20	79
		C- 13	Sheep : Material-cloth	80	53	73	76
		C- 28	Spoon : Fork	65	95	72	76
		C- 45	Doctor : Nurse	73	100	80	76
		C- 46	Leaf : Tea	65	26	55	76
		C- 57	Mousetrap : Mouse	75	100	82	76
		C- 71	Target : Circle	37	68	45	76
		C- 74	(Tennis) racket : Jacket	35	5	28	76
		C- 83	Clothes rack : Shirt	75	100	82	76
		C- 86	Salt shaker : Pepper	63	95	71	76
		C- 96	Tea : Drink	39	84	50	76
		C- 98	Bread : Meat	38	68	45	76
		D- 56	Celery : Carrot	55	85	63	88
		D- 82	Mine worker : Coal	85	53	77	88
		D- 85	Track : Road	44	74	51	88
		E- 6	Hammer : Saw	43	83	54	112
		E- 14	Carriage : Car	68	90	74	112
		E- 21	T.V. : Radio	68	90	74	112
		E- 23	Comb : Brush	45	83	55	112
		E- 28	City : Building	61	86	68	112
		E- 42	Ship : Building	67	100	76	112
		E- 45	Tree : Leaves falling	4	21	8	112
		E- 48	Elbow : Arm	61	86	68	112
		E- 52	Butterfly : Moth	65	90	71	112
		E- 53	Cap : Jacket	46	72	53	112
		E- 57	Cup : Glass	54	86	62	112
		E- 64	Teller : Piggy bank	77	97	82	112
		E- 65	Biplane : Jet	71	97	77	112
		E- 66	Train : Car	19	45	25	112
		E- 69	Light switch : Chandelier	88	69	83	112
		E- 76	Binoculars : Telescope	74	100	81	112
		E- 79	Blacksmith : Cobbler	33	66	41	112
		E- 83	Club : Spade	34	66	42	112
		E- 84	Gum : Cup	5	21	9	112
		E- 87	Broom : Mop	63	89	70	112
		E- 93	Doctor : Lawyer	11	31	16	112
		E- 97	Bass violin : Violin	62	93	76	112
		E- 99	Bumper : Car	72	93	77	112

Table 3

Social Class Differences[a] in Eduction of Relations in Picture Pairs by Type of Relation

	Relation	Item Number	Picture Pair	Percent Yes Low	High	Total	N
I.	Class Member	A- 26	Saw : Log	62	90	85	80
		A- 94	Butter : Knife	62	90	85	80
		B- 17	Fire : Smoke	46	79	74	109
		B- 44	Window : Porthole	31	68	62	109
		B- 72	Pick : Guitar	38	78	72	109
II.	Activity/ Use	D- 5	Soldier : Rifle	92	73	80	121
		D- 12	Cloud (bomb) : Rain	51	24	34	121
		D- 44	Match (flame) : Cigarette	97	81	87	121
		D- 45	Blimp : Helicopter	64	86	77	121
		D- 46	Umbrella : Rain	74	52	61	121
		D- 52	Ear : Bald head	97	78	85	121
		D- 54	Bus : Apartment	44	21	29	121
		D- 98	Smile : Sad	82	59	67	121
		E- 33	Compass : Compass	25	72	66	71
		E- 75	Corn : Horn	50	6	8	97
		E- 84	Gum : Cup	75	4	8	97
		E- 86	Bat : Bat	75	19	22	97
III.	Functional	D- 5	Soldier : Rifle	71	100	94	84
		D- 14	Perfume bottle : Skunk	64	28	35	84
		D- 42	Desert : Snow	50	19	25	84
		D- 68	Wolf : Sheep	21	64	56	84
		D- 83	Bat : Dracula	50	86	79	84
		D- 94	Milk : Milk	71	95	90	84
		E- 33	Compass : Compass	18	70	59	66
		E- 91	Sheep : Yarn	6	38	81	66
		E- 93	Doctor : Lawyer	4	3	13	66
V.	Conversion/ Process	E- 8	Sea : Fish	92	55	66	88
		E- 25	Jack : Car	85	45	57	88
		E- 41	Doctor : Stethoscope	100	58	70	88
		E- 70	Sea : Sailboat	85	45	57	88
		E- 87	Broom : Mop	92	55	66	88
		E- 94	Policeman : Police car	100	58	70	88
VII.	Opposite	D- 13	Spade : Spade	0	52	46	64
		D- 56	Celery : Carrot	100	43	49	64
		E- 58	Milk : Cheese	88	60	71	66
		E- 74	Mop : Floor	80	50	62	66

[a]Statistically significant at the .05 level by chi square test

Table 3 (cont.)

	Relation	Item Number	Picture Pair	Percent Yes Low	High	Total	N
VIII.	Cause-Effect	A- 10	Glass of ice water : Beer mug	65	34	38	120
		A- 43	Tractor : Plow	81	48	39	120
		A- 47	Fruit : Orange	71	33	38	120
		A- 55	Book : Bible	94	38	46	120
		A- 62	Bullet : Rifle	82	50	55	120
		A- 77	Flower bed : Flower	88	60	64	120
		A- 82	Beaver : Cleaver	29	9	12	120
		A- 83	Spring : Fall	53	23	27	120
		A- 99	Pail : Nail	35	4	9	120
		B- 3	Spoon : Soup can	80	23	37	50
		B- 11	Owl : Ant	44	3	13	50
		B- 17	Fire : Smoke	44	84	75	50
		B- 20	Shoe : Shirt	70	16	29	50
		B- 38	Scissors : Hammer	50	0	12	50
		B- 70	Mailman : Letter	50	90	80	50
		B- 82	Elephant : Horse	67	17	28	50
		D- 47	Galaxy : Star	31	65	59	98
		D- 69	Cleaning woman : Broom	100	60	67	98
		E- 12	Plow : Tractor	77	50	61	109
		E- 14	Carriage : Car	91	67	77	109
		E- 17	Caterpillar : Butterfly	80	96	90	109
		E- 46	Door : Window	60	13	31	109
		E- 50	Sun : Moon	77	54	63	109
		E- 53	Cap : Jacket	57	31	41	109
		E- 68	Sun : Rain	57	27	39	109
		E- 71	Lemon : Orange	60	36	46	109
		E- 78	Pencil : Pen	77	47	59	109
		E- 80	Sewing machine : Cloth	74	50	60	109
		E- 86	Bat : Bat	26	7	14	109
		E- 87	Broom : Mop	77	53	62	109
		E- 94	Policeman : Police car	89	67	76	109
		E- 97	Bass violin : Violin	71	45	56	109
IX.	Pattern	A- 76	Dock : Lock	26	61	55	110
		A- 83	Spring : Fall	37	9	14	110
		A- 89	Dice : Rice	53	78	74	110
		A- 97	Flagman : Radar scope	58	23	29	110
		A- 99	Pail : Nail	32	61	56	110
		E- 6	Hammer : Saw	58	17	26	67
		E- 16	Cow : Milk	92	50	59	67
		E- 21	T.V. : Radio	58	17	26	67
		E- 30	Ashtray : Cigarette	83	45	54	67
		E- 43	Log : Hog	73	98	92	67
		E- 48	Elbow : Arm	91	38	49	67
		E- 49	Hunter : Gun	91	31	43	67
		E- 50	Sun : Moon	45	10	17	67

Table 3 (cont.)

	Relation	Item Number	Picture Pair	Percent Yes Low	High	Total	N
IX.	Pattern (cont.)	E- 53	Cap : Jacket	45	7	15	67
		E- 54	Tire : Car	100	24	38	67
		E- 57	Cup : Glass	82	37	46	67
		E- 76	Binoculars : Telescope	83	41	51	67
		E- 80	Sewing machine : Cloth	58	22	30	67
X.	Association	D- 22	Farmer : Plow	79	98	90	97
		D- 27	Log : Dog	21	4	11	97
		D- 42	Desert : Snow	59	30	43	97
		D- 45	Blimp : Helicopter	48	76	65	97
		D- 50	Ham : Dam	18	2	9	97
		D- 51	Piggy bank : Tank	18	2	9	97
		D- 57	Branch : Tree	85	100	94	97
		D- 82	Mine worker : Coal	58	84	73	97
		D- 88	Stamp : Lamp	21	2	10	97
XIV.	Worker-Tool/ Product	D- 35	Battery : Flashlight	58	92	85	83
		D- 56	Celery : Carrot	92	54	62	88
		E- 1	Tennis court : Racket	95	70	76	112
		E- 6	Hammer : Saw	95	41	54	112
		E- 19	Lettuce : Cabbage	95	51	62	112
		E- 21	T.V. : Radio	90	40	52	112
		E- 23	Comb : Brush	95	56	66	112
		E- 28	City : Building	100	66	74	112
		E- 37	Mountain : Hill	90	61	68	112
		E- 48	Elbow : Arm	90	63	70	112
		E- 52	Butterfly : Moth	85	40	51	112
		E- 57	Cup : Glass	95	56	66	112
		E- 65	Biplane : Jet	100	69	77	112
		E- 66	Train : Car	55	16	26	112
		E- 76	Binoculars : Telescope	100	74	80	112
		E- 87	Broom : Mop	95	59	68	112
		E- 90	Cowboy : Indian	80	52	59	112

DISTRIBUTI

Navy

4 Dr. Marshall J. Farr, Director
Personnel and Training Research Programs
Office of Naval Research (Code 458)
Arlington, VA 22217

1 ONR Branch Office
495 Summer Street
Boston, MA 02210
ATTN: J. Lester

1 ONR Branch Office
1030 East Green Street
Pasadena, CA 91101
ATTN: E. E. Glaye

1 ONR Branch Office
536 South Clark Street
Chicago, IL 60605
ATTN: M. A. Bertin

6 Director
Naval Research Laboratory
Code 2627
Washington, DC 20390

12 Defense Documentation Center
Cameron Station, Building 5
5010 Duke Street
Alexandria, VA 22314

1 Special Assistant for Manpower
OASN (M&RA)
Pentagon, Room 4E794
Washington, DC 20350

1 LCDR Charles J. Theisen, Jr., MSC, US
4024
Naval Air Development Center
Warminster, PA 18974

1 Chief of Naval Reserve
Code 3055
New Orleans, LA 70146

1 Dr. Lee Miller
Naval Air Systems Command
AIR-413E
Washington, DC 20361

1 CAPT John F. Riley, USN
Commanding Officer
U. S. Naval Amphibious School
Coronado, CA 92155

1 Chief
Bureau of Medicine & Surgery
Research Division (Code 713)
Washington, DC 20372

1 Chairman
Behavioral Science Department
Naval Command & Management Division
U. S. Naval Academy
Luce Hall
Annapolis, MD 21402

1 Chief of Naval Education & Training
Naval Air Station
Pensacola, FL 32508
ATTN: CAPT Bruce Stone, USN

1 Mr. Arnold Rubinstein
Naval Material Command (NAVMAT 03424)
Room 820, Crystal Plaza #6
Washington, DC 20360

1 Commanding Officer
Naval Medical Neuropsychiatric
Research Unit
San Diego, CA 92152

1 Director, Navy Occupational Task
Analysis Program (NOTAP)
Navy Personnel Program Support
Activity
Building 1304, Bolling AFB
Washington, DC 20336

1 Dr. Richard J. Niehaus
Office of Civilian Manpower Management
Code 06A
Washington, DC 20390

1 Department of the Navy
Office of Civilian Manpower Management
Code 263
Washington, DC 20390

1 Chief of Naval Operations (OP-987E)
Department of the Navy
Washington, DC 20350

1 Superintendent
Naval Postgraduate School
Monterey, CA 93940
ATTN: Library (Code 2124)

1 Commander, Navy Recruiting Command
4015 Wilson Boulevard
Arlington, VA 22203
ATTN: Code 015

1 Mr. George N. Graine
Naval Ship Systems Command
SHIPS 047C12
Washington, DC 20362

1 Chief of Naval Technical Training
Naval Air Station Memphis (75)
Millington, TN 38054
ATTN: Dr. Norman J. Kerr

1 Dr. William L. Maloy
Principal Civilian Advisor
for Education & Training
Naval Training Command, Code 01A
Pensacola, FL 32508

1 Dr. Alred F. Smode, Staff Consultant
Training Analysis & Evaluation Group
Naval Training Equipment Center
Code N-00T
Orlando, FL 32813

1 Dr. Hanns H. Wolff
Technical Director (Code N-2)
Naval Training Equipment Center
Orlando, FL 32813

1 Chief of Naval Training Support
Code N-21
Building 45
Naval Air Station
Pensacola, FL 32508

1 Mr. Dave Robertson
Navy Personnel R&D Center
San Diego, CA 92152

5 Navy Personnel R&D Center
San Diego, CA 92152
ATTN: Code 10

Army

1 Headquarters
U.S. Army Administration Center
Personnel Administration Combat
Development Activity
ATCP-HRO
Ft. Benjamin Harrison, IN 46249

1 Armed Forces Staff College
Norfolk, VA 23511
ATTN: Library

1 Commandant
United States Army Infantry School
ATTN: ATSH-DET
Fort Benning, GA 31905

1 Deputy Commander
U.S. Army Institute of Administration
Fort Benjamin Harrison, IN 46216
ATTN: EA

1 Dr. Stanley L. Cohen
U.S. Army Research Institute
1300 Wilson Boulevard
Arlington, VA 22209

1 Dr. Ralph Dusek
U.S. Army Research Institute
1300 Wilson Boulevard
Arlington, VA 22209

1 Mr. Edmund F. Fuchs
U.S. Army Research Institute
1300 Wilson Boulevard
Arlington, VA 22209

1 Dr. J. E. Uhlaner, Technical Director
U.S. Army Research Institute
1300 Wilson Boulevard
Arlington, VA 22209

1 Dr. Joseph Ward
U.S. Army Research Institute
1300 Wilson Boulevard
Arlington, VA 22209

1 HQ USAREUR & 7th Army
ODCSOPS
USAREUR Director of GED
APO New York 09403

Air Force

1 Research Branch
AF/DPMYAR
Randolph AFB, TX 78148

1 Dr. G. A. Eckstrand (AFHRL/AS)
Wright-Patterson AFB
Ohio 45433

1 AFHRL/DOJN
Stop #63
Lackland AFB, TX 78236

1 Dr. Robert A. Bottenberg (AFHRL/SM)
Stop #63
Lackland AFB, TX 78236

1 Dr. Martin Rockway (AFHRL/TT)
Lowry AFB
Colorado 80230

1 Major P. J. DeLeo
Instructional Technology Branch
AF Human Resources Laboratory
Lowry AFB, CO 80230

1 AFOSR/NL
1400 Wilson Boulevard
Arlington, VA 22209

1 Commandant, USAF School of Aerospace Medicine
Aeromedical Library (SUL-4)
Brooks AFB, TX 78235

Marine Corps

1 Mr. E. A. Dover
Manpower Measurement Unit (Code MPI)
Arlington Annex, Room 2413
Arlington, VA 20380

1 Commandant of the Marine Corps
Headquarters, U.S. Marine Corps
Code MPI-20
Washington, DC 20380

1 Director, Office of Manpower Utilization
Headquarters, Marine Corps (Code MPU)
MCB (Building 2009)
Quantico, VA 22134

1 Dr. A. L. Slafkosky
Scientific Advisor (Code RD-1)
Headquarters, U.S. Marine Corps
Washington, DC 20380

Coast Guard

1 Mr. Joseph J. Cowan, Chief
Psychological Research Branch (G-P-1/6)
U.S. Coast Guard Headquarters
Washington, DC 20590

Other DOD

1 Lt. Col. Henry L. Taylor, USAF
Military Assistant for Human Resources
OAD (E & LS) ODDR&E
Pentagon, Room 3D129
Washington, DC 20301

1 Col. Austin W. Kibler
Advanced Research Projects Agency
Human Resources Research Office
1400 Wilson Boulevard
Arlington, VA 22209

Other Government

1 Dr. Lorraine D. Eyde
Personnel Research and Development Center
U.S. Civil Service Commission
1900 E. Street, NW
Washington, DC 20415

1 Dr. William Gorham, Director
Personnel Research and Development Center
U.S. Civil Service Commission
1900 E. Street, NW
Washington, DC 20415

1 Dr. Vern Urry
Personnel Research and Development Center
U.S. Civil Service Commission
1900 E. Street, N.W.
Washington, DC 20415

1 Dr. Eric McWilliams, Program Manager
Technology and Systems, TIE
National Science Foundation
Washington, DC 20550

1 Dr. Andrew R. Molnar
Technological Innovations in Education
National Science Foundation
Washington, DC 20550

1 U.S. Civil Service Commission
Federal Office Building
Chicago Regional Staff Division
ATTN: C. S. Winiewicz
Regional Psychologist
230 So. Dearborn St.
Chicago, IL 60604

Miscellaneous

1 Dr. Scarvia B. Anderson
Educational Testing Service
17 Executive Park Drive
Atlanta, GA 30329

1 Dr. John Annett
The Open University
Milton Keynes
Buckinghamshire
ENGLAND

1 Dr. Richard C. Atkinson
Stanford University
Department of Psychology
Stanford, CA 94305

1 Dr. Gerald V. Barrett
University of Akron
Department of Psychology
Akron, OH 44325

1 Dr. Bernard M. Bass
University of Rochester
Management Research Center
Rochester, NY 14627

1 Mr. Kenneth M. Bromberg
Manager - Washington Operations
Information Concepts, Inc.
1701 North Fort Myer Drive
Arlington, VA 22209

1 Dr. Ronald P. Carver
School of Education
University of Missouri - Kansas City
Kansas City, MO 64110

1 Centry Research Corporation
4113 Lee Highway
Arlington, VA 22207

1 Dr. Kenneth E. Clark
University of Rochester
College of Arts & Sciences
River Campus Station
Rochester, NY 14627

1 Dr. Rene' V. Dawis
University of Minnesota
Department of Psychology
Minneapolis, MN 55455

1 Dr. Norman R. Dixon
Room 170
190 Lothrop Street
Pittsburgh, PA 15260

1 Dr. Robert Dubin
University of California
Graduate School of Administration
Irvine, CA 92664

1 Dr. Marvin D. Dunnette
University of Minnesota
Department of Psychology
Minneapolis, MN 55455

1 ERIC
Processing and Reference Facility
4833 Rugby Avenue
Bethesday, MD 20014

1 Dr. Victor Fields
Montgomery College
Department of Psychology
Rockville, MD 20850

1 Dr. Edwin A. Fleishman
American Institutes for Research
Foxhall Square
3301 New Mexico Avenue, NW
Washington, DC 20016

1 Dr. Robert Glaser, Director
University of Pittsburgh
Learning Research & Development
Center
Pittsburgh, PA 15213

1 Mr. Harry H. Harman
Educational Testing Services
Princeton, NJ 08540

1 Dr. Richard S. Hatch
Decision Systems Associates, Inc.
11428 Rockville Pike
Rockville, MD 20852

1 Dr. M. D. Havron
Human Sciences Research, Inc.
7710 Old Spring House Road
West Gate Industrial Park
McLean, VA 22101

1 HumRRO
Division No. 3
P.O. Box 5787
Presidio of Monterey, CA 93940

1 HumRRO
Division No. 6, Library
P.O. Box 428
Fort Rucker, IL 36360

1 Dr. Lawrence B. Johnson
Lawrence Johnson & Associates, Inc.
200 S. Street, NW, Suite 502
Washington, DC 20009

1 Dr. Milton S. Katz
MITRE Corporation
Westgate Research Center
McLean, VA 22101

1 Dr. Steven W. Keele
University of Oregon
Department of Psychology
Eugene, OR 97403

1 Dr. David Klahr
Carnegie-Mellon University
Department of Psychology
Pittsburgh, PA 15213

1 Dr. Frederick M. Lord
Educational Testing Service
Princeton, NJ 08540

1 Dr. Ernest J. McCormick
Purdue University
Department of Psychological Sciences
Lafayette, IN 47907

1 Dr. Robert R. Mackie
Human Factors Research, Inc.
6780 Cortona Drive
Santa Barbara Research Park
Goleta, CA 93017

1 Mr. Edmond Marks
405 Old Main
Pennsylvania State University
University Park, PA 16802

1 Dr. Leo Munday, Vice-President
American College Testing Program
P.O. Box 168
Iowa City, IA 52240

1 Mr. Luigi Petrullo
2431 North Edgewood Street
Arlington, VA 22207

1 Dr. Diane M. Ramsey-Klee
R-K Research & System Design
3947 Ridgemont Drive
Malibu, CA 90265

1 Dr. Joseph W. Rigney
University of Southern California
Behavioral Technology Laboratories
3717 South Grand
Los Angeles, CA 90007

1 Dr. Leonard L. Rosenbaum, Chairman
Montgomery College
Department of Psychology
Rockville, MD 20850

1 Dr. George E. Rowland
Rowland and Company, Inc.
P.O. Box 61
Haddonfield, NJ 08033

1 Dr. Arthur I. Siegel
Applied Psychological Services
404 East Lancaster Avenue
Wayne, PA 19087

1 Dr. C. Harold Stone
1428 Virginia Avenue
Glendale, CA 91202

1 Mr. Dennis J. Sullivan
725 Benson Way
Thousand Oaks, CA 91360

1 Dr. Benton J. Underwood
Northwestern University
Department of Psychology
Evanston, IL 60201

1 Carl R. Vest, Ph.D.
Battelle
Memorial Institute
Washington Operations
2030 - M Street, NW
Washington, DC 20036

1 Dr. Roger A. Kaufman
United States International
University
Graduate School of Leadership and
Human Behavior
Elliott Campus
8655 E. Pmerada Road
San Diego, CA 92124

1 Dr. Anita West
Denver Research Institute
University of Denver
Denver, CO 80210